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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Paper No. 47

Application Number: 08/833,620
Filing Date: April 07, 1997
Appellant(s): DOBBINS ET AL.

Michael L. Goldman
For Appellant

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EXAMINER'S ANSWER

This is in response to the appeal brief filed 12-30-2002.

(1) *Real Party in Interest*

A statement identifying the real party in interest is contained in the brief.

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(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(6) Issues

The appellant's statement of the issues in the brief is correct.

(7) Grouping of Claims

Appellant's brief includes a statement that claims 36-38 and 51-53 do not stand or fall with all the other claims together and provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8). Examiner agrees with this in view of the evidence for new and unexpected results which is directed to claim 36-38 and 51-53.

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

4,501,602	MILLER et al	02-1985
EP 0038900	SCHWARZ et al.	03-1984
2,272,342	HYDE	08-1934
JP 1-138145	KAWAGUCHI (also referred to as '145)	05-1989

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

Claims 12, 13, 22, 33-38, 41-44, 46-47 and 53 as well as claims 39-42 and 50-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miller 4501602 in view of Schwarz EP0038900 and optionally in view of Hyde 2272342 and/or JP 138145 ('145).

Each of the independent claims is in Jepson style format. There is no disagreement that the only issues pertain to the "improvement" of "wherein the improvement comprises" limitation. Miller discloses that which is old. Schwarz, Hyde and '145 are directed to the improvement.

Miller teaches the invention substantially at col. 1, lines 10-31. This is a method of making soot along with further processing to make a complete glass body (See Claim 1 and figure 4 of Miller) Col. 12, line 3-8 of Miller essentially discloses that Miller's invention is an improvement of that col. 1 process. Miller fails to disclose the broadly claimed polymethylcyclsiloxanes. Nor does Miller teach the specific species of octamethylcyclotetrasiloxane (OMCTS), decamethylcyclopentasiloxane (DMCPS) or hexamethylcyclotrisiloxane (HMCTS). Instead, Miller uses silicon tetrachloride. However, Miller teaches that it is known that other silicon compounds can be used (col.1, lines 32-41).

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Schwarz teaches to substitute siloxanes for the tetrachloride in the production of silica (see the claim on the first page of the translation of Schwarz) soot because: (1) such is free of chlorine and (2) absence of the need to get rid of acid (Page 3, lines 3-9). It would have been obvious to alter the steps that Miller uses to make soot by using one of the Schwarz cyclosiloxanes for the advantages of Schwarz. It is noted that Schwarz's second advantage is essentially the same as Applicant's advantage (on page 3, 1st paragraph).

Hyde is cited because it discloses that for nearly 70 years it has been known that one can use any hydrolysable compound in making silica soot (page 2, lines 34-37).

'145 is cited as documenting a reasonable expectation of success for making a high quality optical silica glass using a cyclosiloxane (see entire translation of '145 and most particularly - page 6, lines 7-26). Although no cyclosiloxane is explicitly mentioned, one looking at '145 would at once envisage the cyclosiloxanes. (see 2nd paragraph following).

A generic formula is a disclosure of a compound if that compound is "at once envisaged" by one of ordinary skill. In re Petering, 301 F.2d 676, 133 USPQ 275 (CCPA 1962). From this case law, it stands to reason if a generic formula is such that one *at once envisions* (rather than a specific compound) a entire sub-class of compounds (e.g. cyclosiloxanes) then the generic formula discloses that sub-class.

The rationale that one would at once envision cyclosiloxanes is as follows: Page 6, lines 20-24 of '145 discloses a sub-group of siloxanes; specifically, the $\text{Si}_x \text{R}_y \text{O}_z$ compound. Small values of x would be envisioned (i.e. 2,3,4). R = methyl would be

envisioned because it is disclosed in the hexamethyldisiloxane and it is a very simple alkyl. One would envision Y to be a value less than $2x + 2$ (otherwise the phrase "not higher than $2x + 2$ " would be replaced with "is $2x+2$ ". And if Y is less than $2x + 2$, the compound is a cyclosiloxane - because there is no other appropriate structure for a siloxane with fewer than $2x+2$ monovalent hydrocarbon groups as required by '145. A more detailed (yet slightly different) analysis was presented in paper 39, incorporated in the final rejection and is reproduced below. Since one would at once envision the subclass polymethylcyclosiloxane, '145 discloses that subclass.

As to claims 33-38, 44, 47 and 51-53 see Schwarz, page 3, line 4.

As to claims 41-42. it would have been obvious to use air as the oxygen source because it is free (except for any filtering for dust). Air comprises nitrogen, which is an inert gas.

AS to claims 41-42, Page 6 of '145 teaches to use oxygen in the stream. It would have been obvious to use air as the oxygen since it is the cheapest form of oxygen. Air has nitrogen.

Case law: When the compound is not specifically named, but instead it is necessary to select portions of teachings within a reference and combine them, e.g., select various substituents from a list of alternatives given for placement at specific sites on a generic chemical formula to arrive at a specific composition, anticipation can only be found if the classes of substituents are sufficiently limited or well-delineated. Ex parte A, 17 USPQ2d 1716 (Bd. Pat. App. & Inter. 1990). If one of ordinary skill in the art is able to 'at once envisage' the specific compound within the generic chemical formula, the compound is anticipated. One of ordinary skill in the art must be able to draw the structural formula or write the name of each compounds included in the generic formula before any of the compounds can be "at once envisaged". One may look to the preferred embodiments to determine which compounds can be anticipated. In re Petering, 301 F.2d 676, 133 USPQ 275 (CCPA 1962).

'145 does not specifically name the subgenus "polymethylcyclosiloxane" But all of the other limitations are taught - for example at figure 1. It is deemed that the above case law also applies to a claimed subgenus when only a genus is sufficiently limited or well delineated. In '145, page 6, line 20 first limits teaches the genus, "siloxanes. The on line 21, further limits (by a formula) it to a specific type of siloxane. And on lines 22-24, the compound is still further limited. The R as a methyl group is mentioned specifically at lines 10-12. It is deemed that the teachings are such that the claimed subgenus of polymethylcyclosiloxanes is at once envisaged.

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By fact that the methyl group is taught, '145 clearly anticipates polymethylsiloxanes. By fact that '145 uses the language that y is "not higher than $2x + 2$ ", one of ordinary skill is immediately put on notice that " y " (of the $Si_xR_yO_z$ formula) can be less than $2x + 2$. One who is handy with such chemical formulas would immediately recognize that this refers to a cyclic structure: a siloxane backbone (i.e. alternating O and Si) has two radicals off of each Si atom - except for the any Si on the end. A Si - atom on the end of a chain would have 3 radicals. To look at it mathematically, # of radicals = (# of Si-atoms) \times 2 + the 2 end radicals (i.e. one on either end). Thus the " $2x + 2$ " value. But when one tries to reduce y (i.e. the number of radicals R) to be less than $2x+2$, the only option available is a cyclic (ring) siloxane (i.e. removal of the 2 end radicals).

Alternatively there are only three types of methylsiloxanes: linear, branched and cyclic. Thus this genus is "sufficiently limited to" only three possible types of siloxanes, thus one of ordinary skill readily envisages the subgenus cyclosiloxane form of the methylsiloxanes.

(11) Response to Argument

It is noted that there is no difference between silica and silicic acid to one of ordinary skill in the flame hydrolysis art. First, Schwarz uses the terms interchangeably. Second, Appellant does not argue that Schwarz doesn't produce silica. Third, Appellant's invention inherently has hydroxyl ions incorporated in the soot body, as evidenced by the Example 3 usage of chlorine. One of ordinary skill realizes that the chlorine is used to remove the hydroxyl ions.

It is argued that Schwarz does not disclose that the silica (i.e. silicic acid) is suitable for build up as a deposit on a support. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). First, the supplemental references HYDE and '145 show that one would expect that one could easily use the cyclosiloxane to build up silica on the support. One who has basic knowledge of silica processing via flame hydrolysis knows that it is simple matter of process parameters - if the soot particles are hot enough to stick together on a support, then they will stick. If however, the particles are permitted to cool sufficiently prior to impacting anything, they will not

stick together. Hyde shows that for almost 70 years it has been known that hydrolysable compound of silicon can be used to form silica on a support (page 2, lines 34-37). Since Schwarz shows that the claimed cyclosiloxane is hydrolysable, one would reasonably expect it to work in a silica deposition method. The '145 reference clearly teaches that one can deposit silica from siloxanes onto supports.

It is also argued that '145 does not mention explicit support for the use of a polymethylcyclosiloxane. '145 need not explicitly mention the compound to teach the compound. It is noted that the arguments fail to question the rationale and conclusion that one viewing the '145 would at once envision the claimed polymethylcyclosiloxane; therefore it is deemed that Appellant agrees with the conclusion that one of ordinary skill reading '145 would at once envisage the polymethylcyclosiloxane.

It is further argued that the compound would not work in view of the Dobbins Declaration (paper 20) - because one would not expect all of the carbon atoms to combust. This does not seem reasonable. Methyl groups combust readily. There is only an allegation that one would expect the carbon to be created. There would have to be something extraordinary happening for the methyl groups not to completely combust.

The arguments and the declaration refer to Kratel (GB 2049641) as evidence that carbon will form. However the last sentence of the cited passage in Kratel teaches how to overcome that problem: "This result...has previously been counteracted by using an additional fuel, namely an additional gas that will burn to form water, for example hydrogen or hydrocarbon."

Further arguments were made with Lipowitz. This passage has not been shown to be relevant to the conditions that would be present in the obvious combination. It is noted that the Lipowitz passage starts out: "Under fuel-rich conditions...." There is no indication that one would use the prior art under fuel-rich conditions. One of ordinary skill would instantly realize that a "fuel-rich" flame is the same thing as being "oxygen poor". There is no reason to expect that one would use the prior art in an oxygen -poor flame, thus there is no reason to give Lipowitz any relevance in the present situation. And even if one of ordinary skill were to use the Miller invention in an oxygen-deficient manner, one would reasonably expect that the carbon would not completely oxidize - simply because there isn't enough oxygen. The Lipowitz paragraph (page 487) that precedes the section cited by Appellant refers to one possible flame with "complete combustion". Appellant has failed to demonstrate that Lipowitz's problems with non-complete combustion has any relevance with the modified Miller process.

It is further argued that one would not care if there was carbon in the thickeners of Schwarz. Even if this is true, Schwarz teaches to use the powder in toothpaste and varnish (page 1, 2nd paragraph). Examiner doubts anyone would buy black or grey toothpaste or varnish.

It is further argued that one would not want carbon in the glass body. Examiner agrees, but this is of little relevance: '145 discloses that one can use the claimed siloxanes to create clear bodies. The last paragraph of page 3 of '145 states that one can create the silica with "high" transmittance and there are no disturbances.

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Weighing the evidence: 1) Kratel teaches the problem of formation of carbon (and the solution of that problem) and 2) Lipowitz teaches the formation of carbon with fuel rich (i.e. oxygen deficient) flames, and no indication that one would have used the Miller process with a fuel rich flame versus the teaching of '145 which discloses high transmittance glass. The totality of the evidence suggests that at the time of the invention, one of ordinary skill would have expected to be able to successfully use the claimed starting material in the Miller project - and if carbon was to form, one would know to adjust the flame stoichiometry to get complete combustion.

Unexpected results and the Powers declaration (paper 28).

The declaration alleges unexpected results for Octamethylcyclotetrasiloxane and for Decamethylcyclopentasiloxane. The independent claims are not limited to those compounds. Only claims 36-38 and 51-53 are limited to a compound addressed in the Powers declaration. It is well established that the evidence relied upon must be commensurate in scope with the claimed subject matter. *In re Kerkhoven*, 626 F. 2d 846, 851, 205 USPQ 1069, 1072-1073 (CCPA 1980).

Second it is noted that even if there is a showing of unexpected results, it does not mandate the claims are patentable. *In re Chupp*, 816 F.2d 643, 2 USPQ2d 1437 (Fed Cir. 1987). The entire record must be considered.

Third, differences are expected between prior art and claimed inventions. The issue is whether the properties differ to such an extent that the difference is really unexpected. *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986)

Fourth, the burden is on Applicant to establish that the results are unexpected and significant. See MPEP 716.02(b)

Whereas Appellant has shown differences, the differences shown by applicant have not been shown to be unexpected. The submitted evidence for the results being unexpected is that Schwarz states that "a preferred embodiment" is hexamethyldisiloxane - and thus one would expect that this yields the higher deposition rate. Appellant concludes that since the OMCTS gives a higher deposition rate, that it is an unexpected result. Appellant has failed to show that one would expect Schwarz's embodiment was preferred because the deposition rate is what Schwarz held as being preferred. Schwarz embodiment could be preferred because of cost, deposition *efficiency*, ease of control, lower temperature, or anything else.

Furthermore, the difference shown by Appellant would reasonably be expected - simply because the result of more finished product is a result of beginning with more material. Appellant got more silica (silicic acid) because Applicant started with more silicon atoms. Such is not unexpected.

AS an analogy, an acetylene flame will burn at a higher temperature, than an methane flame; such a difference is not unexpected - basic chemical thermodynamics would predict that the acetylene flame would be higher because more energy is released. In the same way, Octamethylcyclotetrasiloxane should generate more silica than hexamethyldisiloxane because the OMCTS has twice as many silicon atoms as does HMDS. (tetra vs. di). One would reasonably expect that OMCTS should deposit

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more silicon dioxide than HMDS. It is not an unexpected result to expect that more starting material yields more final product.

In response to this, Appellant argued that when Powers tried to increase the flow rate of HMDS to correspond to the silicon atom delivery rate of OMCTS, that the burner flame becomes unstable. One of ordinary skill realizes that a burner cannot accommodate all possible flow rates. It is unreasonable to expect that one can simply double the flow rate of HMDS without effecting the flame characteristics. Again, although Appellant has shown differences, there has been no showing that the differences would have been unexpected. A more relevant test would be reducing the Silicon atom supply rate of OMTCS to that of HMDS. However, a showing of this would not necessarily result in a showing of unexpected results.

It is furthered argued that comparison of Si atoms in the starting materials are not based on real world gas models, or how the relative amounts of Si atoms relate to the specific values in the Powers Declaration. The arguments are not made to show that one could predict exactly what one would expect. Examiner is merely pointing out that under basic considerations, (stoichiometry and the ideal gas law) that one of ordinary skill would expect there to be differences between the starting materials. Therefore, Appellant's showing of differences is not sufficient to support the conclusion that the differences are unexpected.

THIS above all, there is no showing that Applicant's results can be extrapolated to the wide scope covered by the claims. Appellant experiment is based on a method that has a burner 15 cm from a 3/8 inch bait rod. There is no evidence that the results

can be extrapolated to a burner that is, say, 10 cm from a $\frac{1}{2}$ in bait rod. Furthermore, there is no evidence that results can be extrapolated to different temperatures, burner sizes, burner types, VAD vs. MCVD, and any other parameters that have been known to be relevant in deposition processes. There is no indication that one would reasonably extrapolate the Powers results to the entire scope that the claims are directed. The claims would cover any temperature, any burner, any flow rate, any soot deposition method, etc. With changing the parameters, the HMDS might yield superior results - thus it is improper to allow claims based on unexpected results for only one set of parameters - unless the claims are limited to those specific parameters. It is well established that the evidence relied upon must be commensurate in scope with the claimed subject matter. *In re Kerkhoven*, 626 F. 2d 846, 851, 205 USPQ 1069, 1072-1073 (CCPA 1980). Appellant has not met the burden of explaining how the results reported in the declaration can be extrapolated from the limited instances presented so as to be guaranteed as attainable through practicing the invention as broadly claimed.

Further unexpected results are alleged for OMCTS vs. SiCl_4 . Figure 4 in the specification as filed shows there is better efficiency for some low deposition rates. Again, this is only support for showing better results for the particular rates using the particular process parameters that Applicant used to obtain the results. Using a different flame temperature, a different burner design, or target geometry might yield a different results. Appellant has not met the burden of explaining how the results reported in figure 4 can be extrapolated from the limited instances presented so as to be guaranteed as attainable through practicing the invention as broadly claimed.

Further, there is no showing that the improved results of figure 4 are truly unexpected. There is only the allegation that the results are unexpected.

Furthermore, most of the data of Applicant's figure 4 is not likely to be very relevant. One would not expect to care what the deposition efficiency is at the low deposition rates (i.e. the left side of figure 4). Clearly, one of ordinary skill would be motivated to avoid the right hand of the graph and operate the invention at the right hand side of figure 4 - which yields higher efficiencies and more silica creation. Additionally, the figure is misleading because there are straight lines through the data points. There is no basis for concluding the relationship is a linear one. If one was to be linear, at high deposition rates, the efficiencies would exceed 100% efficiency - which is impossible because one cannot deposit more than one creates. There would have to be some leveling off of the data at the right end of the graph. Perhaps the SiCl_4 levels off at a higher level than the OMCTS.

It is argued that Examiner made a "speculative assertion" that the highest efficiencies are nearly identical to each other and that the "assertion" is incorrect because the data of the graph figure 4 "consistently has a significantly higher deposition efficiency." The Applicant's arguments addresses the totality of the graph and fails to address the "assertion" which only address the "highest efficiencies". Examiner's assertion points to only the most important data points - i.e. those data points in the 50-60% efficiency range. There is not much difference between the highest achieved efficiencies. Further, given the scatter of data at the left end of the graph, one has to question the statistical significance of the few data points at the right side of the graph;

i.e. it is doubtful that one can confidently conclude that the highest OMTCS efficiency is statistically better than the highest SiCl₄ efficiency.

Examiner realizes that the Board may disagree with the Examiner and hold that Appellant has demonstrated unexpected results. If this were to happen, Examiner offers the following position: the Schwarz motivation of not producing chlorine is not sufficient to outweigh a showing of new and unexpected results for claims 36-38 and 51-53 - given the long-term trend of using silicon tetrachloride.

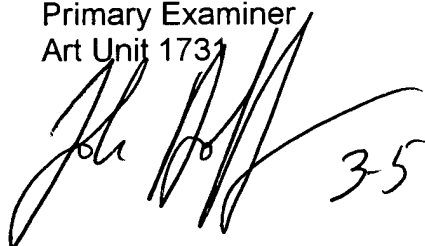
However, if the Board determines Appellant has failed to demonstrate new and unexpected results: In view of a lack of a meaningful showing of any unexpected result, and that the Schwarz reference teaches the use of the claimed compounds for a same motivation that Applicant uses the claimed compounds, Examiner maintains the invention would have been obvious.

For the above reasons, it is believed that the rejections should be sustained.

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Respectfully submitted,

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